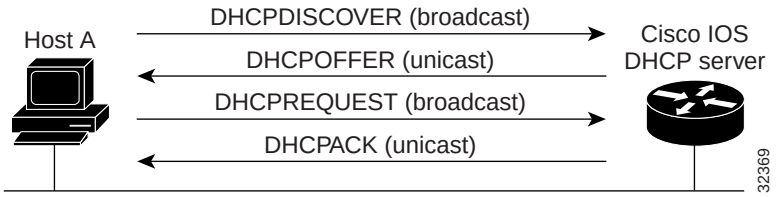
Cisco IOS DHCP Server

Feature Overview

Dynamic Host Control Protocol (DHCP) enables you to automatically assign reusable IP addresses to DHCP clients. The Cisco IOS DHCP Server feature is a full DHCP server implementation that assigns and manages IP addresses from specified address pools within the router to DHCP clients. If the Cisco IOS DHCP Server cannot satisfy a DHCP request from its own database, it can forward the request to one or more secondary DHCP servers defined by the network administrator.

Figure 1 shows the basic steps that occur when a DHCP client requests an IP address from a DHCP server. The client, Host A, sends a DHCPDISCOVER broadcast message to locate a Cisco IOS DHCP Server. A DHCP server offers configuration parameters (such as an IP address, a MAC address, a domain name, and a lease for the IP address) to the client in a DHSCPOFFER unicast message.

Figure 1 DHCP Request for an IP Address from a DHCP Server



Note A DHCP client may receive offers from multiple DHCP servers and can accept any one of the offers; however, the client usually accepts the first offer it receives. Additionally, the offer from the DHCP server is not a guarantee that the IP address will be allocated to the client; however, the server usually reserves the address until the client has had a chance to formally request the address.

The client returns a formal request for the offered IP address to the DHCP server in a DHCPREQUEST broadcast message. The DHCP server confirms that the IP address has been allocated to the client by returning a DHCPACK unicast message to the client.

Note The formal request for the offered IP address (the DHCPREQUEST message) that is sent by the client is broadcast so that all other DHCP servers that received the DHCPDISCOVER broadcast message from the client can reclaim the IP addresses that they offered to the client.

If the configuration parameters sent to the client in the DHCPOFFER unicast message by the DHCP server are invalid (a misconfiguration error exists), the client returns a DHCPDECLINE broadcast message to the DHCP server.

The DHCP server will send to the client a DHCPNAK denial broadcast message, which means the offered configuration parameters have not been assigned, if an error has occurred during the negotiation of the parameters or the client has been slow in responding to the DHCPOFFER message (the DHCP server assigned the parameters to another client) of the DHCP server.

Benefits

The Cisco IOS DHCP Server feature offers the following benefits:

- Reduced Internet access costs

  Using automatic IP address assignment at each remote site substantially reduces Internet access costs. Static IP addresses are considerably more expensive to purchase than are automatically allocated IP addresses.

- Reduced client configuration tasks and cost**s**

  Because DHCP is easy to configure, it minimizes operational overhead and costs associated with device configuration tasks and eases deployment by nontechnical users.

- Centralized management

  Because the DHCP server maintains configurations for several subnets, an administrator only needs to update a single, central server when configuration parameters change.

Supported Platforms

This Cisco IOS DHCP Server feature is supported on the following routers and access servers:

- Catalyst 5000 family switches with an installed Route Switch Module
- Catalyst 6000 family switches with an installed MultiLayer Switch Feature Card
- Catalyst 8500 series
- Cisco 800 series
- Cisco 1000 series
- Cisco 1400 series
- Cisco 1600 series
- Cisco 1700 series (support for the Cisco 1700 series was added in Cisco IOS Release 12.0[2]T)
- Cisco 2500 series
- Cisco 2600 series
- Cisco 3600 series
- Cisco 3800 series

- Cisco MC3810 series
- Cisco 4000 series
- Cisco AS5100 access server
- Cisco AS5200 universal access server
- Cisco AS5300 universal access server
- Cisco 7000 series
- Cisco 7100 series
- Cisco 7200 series
- Cisco MGX 8800 with an installed Route Processor Module
- Cisco 12000 series
- Cisco uBR900 series
- Cisco uBR7200 series

Supported Standards, MIBs, and RFCs

Standards

No new or modified standards are supported by this feature.

MIBs

No new or modified MIBs are supported by this feature.

For descriptions of supported MIBs and how to use MIBs, see the Cisco MIB web site on CCO at http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml.

RFCs

- RFC 951, *Bootstrap Protocol (BOOTP)*
- RFC 1542, *Clarifications and Extensions for the Bootstrap Protocol*
- RFC 2131, *Dynamic Host Configuration Protocol*
- RFC 2132, *DHCP Options and BOOTP Vendor Extensions*

Prerequisites

Before you configure the Cisco IOS DHCP Server feature, complete the following tasks:

- Identify an external File Transport Protocol (FTP), Trivial File Transfer Protocol (TFTP), or remote copy protocol (rcp) server that you will use to store the DHCP bindings database.
- Identify the IP addresses that you will enable the DHCP server to assign, and the IP addresses that you will exclude.
- Identify DHCP options for devices where necessary, including:
  - Default boot image name
  - Default router(s)
  - Domain Name System (DNS) server(s)
  - NetBIOS name server
- Decide on a NetBIOS node type (b, p, m, or h).
- Decide on a DNS domain name.

DHCP Configuration Task List

The DHCP server database is organized as a tree. The root of the tree is the address pool for natural networks, branches are subnetwork address pools, and leaves are manual bindings to clients. Subnetworks inherit network parameters and clients inherit subnetwork parameters. Therefore, common parameters, for example the domain name, should be configured at the highest (network or subnetwork) level of the tree.

Note Inherited parameters can be overridden. For example, if a parameter is defined in both the natural network and a subnetwork, the definition of the subnetwork is used.

Address leases are not inherited. If a lease is not specified for an IP address, by default, the DHCP server assigns a one-day lease for the address.

To configure the Cisco IOS DHCP Server feature, first configure a database agent or disable conflict logging, then configure IP addresses that the DHCP server should not assign (excluded addresses) and should assign (a pool of available IP addresses) to requesting clients. These configuration tasks are explained in the following sections. Each task in the following list is identified as required or optional.

- Configuring a DHCP Database Agent or Disabling DHCP Conflict Logging (Required)
- Excluding IP Addresses (Required)
- Configuring a DHCP Address Pool (Required)
- Configuring Manual Bindings (Optional)
- Configuring a DHCP Server Boot File (Optional)
- Configuring the Number of Ping Packets (Optional)
- Configuring the Timeout Value for Ping Packets (Optional)
- Enabling the Cisco IOS DHCP Server Feature (Optional)

Configuring a DHCP Database Agent or Disabling DHCP Conflict Logging

A DHCP database agent is any host, for example, an FTP, TFTP, or RCP server that stores the DHCP bindings database. You can configure multiple DHCP database agents and you can configure the interval between database updates and transfers for each agent. To configure a database agent and database agent parameters, use the following command in global configuration mode:

Command	Purpose
Router(config)# **ip dhcp database** *url* [**timeout** *seconds* | **write-delay** *seconds*]	Configures the database agent and the interval between database updates and database transfers.

If you choose not to configure a DHCP database agent, disable the recording of DHCP address conflicts on the DHCP server. To disable DHCP address conflict logging, use the following command in global configuration mode:

Command	Purpose
Router(config)# **no ip dhcp conflict logging**	Disables DHCP address conflict logging.

Excluding IP Addresses

The DHCP server assumes that all IP addresses in a DHCP address pool subnet are available for assigning to DHCP clients. You must specify the IP address that the DHCP server should not assign to clients. To do so, use the following command in global configuration mode:

Command	Purpose
Router(config)# **ip dhcp excluded-address** *low-address* [*high-address*]	Specifies the IP addresses that the DHCP server should not assign to DHCP clients.

Configuring a DHCP Address Pool

You can configure a DHCP address pool with a name that is a symbolic string (such as “engineering”) or an integer (such as 0). Configuring a DHCP address pool also places you in DHCP pool configuration mode—identified by the (config-dhcp)# prompt—from which you can configure pool parameters (for example, the IP subnet number and default router list). To configure a DHCP address pool, complete the required tasks in the following sections.

Configuring the DHCP Address Pool Name and Entering DHCP Pool Configuration Mode

To configure the DHCP address pool name and enter DHCP pool configuration mode, use the following command in global configuration mode:

Command	Purpose
Router(config)# **ip dhcp pool** *name*	Creates a name for the DHCP server address pool and places you in DHCP pool configuration mode (identified by the config-dhcp# prompt).

Configuring the DHCP Address Pool Subnet and Mask

To configure a subnet and mask for the newly created DHCP address pool, which contains the range of available IP addresses that the DHCP server may assign to clients, use the following command in DHCP pool configuration mode:

Command	Purpose
Router(config-dhcp)# **network** *network-number* [*mask* | */prefix-length*]	Specifies the subnet network number and mask of the DHCP address pool. The prefix length specifies the number of bits that comprise the address prefix. The prefix is an alternative way of specifying the network mask of the client. The prefix length must be preceded by a forward slash (/).

Configuring the Domain Name for the Client

The domain name of a DHCP client places the client in the general grouping of networks that make up the domain. To configure a domain name string for the client, use the following command in DHCP pool configuration mode:

Command	Purpose
Router(config-dhcp)# **domain-name** *domain*	Specifies the domain name for the client.

Configuring the Domain Name System IP Servers for the Client

DHCP clients query DNS IP servers when they need to correlate host names to IP addresses. To configure the DNS IP servers that are available to a DHCP client, use the following command in DHCP pool configuration mode:

Command	Purpose
Router(config-dhcp)# **dns-server** *address* [*address2 ... address8*]	Specifies the IP address of a DNS server that is available to a DHCP client. One IP address is required; however, you can specify up to eight IP addresses in one command line.

Configuring the NetBIOS Windows Internet Naming Service IP Servers for the Client

Windows Internet Naming Service (WINS) is a name resolution service that Microsoft DHCP clients use to correlate host names to IP addresses within a general grouping of networks. To configure the NetBIOS WINS servers that are available to a Microsoft DHCP client, use the following command in DHCP pool configuration mode:

Command	Purpose
Router(config-dhcp)# **netbios-name-server** *address* [*address2 ... address8*]	Specifies the NetBIOS WINS server that is available to a Microsoft DHCP client. One address is required; however, you can specify up to eight addresses in one command line.

Configuring the NetBIOS Node Type for the Client

The NetBIOS node type for Microsoft DHCP clients can be one of four settings: broadcast, peer-to-peer, mixed, or hybrid. To configure the NetBIOS node type for a Microsoft DHCP, use the following command in DHCP pool configuration mode:

Command	Purpose
Router(config-dhcp)# **netbios-node-type** *type*	Specifies the NetBIOS node type for a Microsoft DHCP client.

Configuring the Default Router for the Client

After a DHCP client has booted, the client begins sending packets to its default router. The IP address of the default router should be on the same subnet as the client. To configure a default router for a DHCP client, use the following command in DHCP pool configuration mode:

Command	Purpose
Router(config-dhcp)# **default-router** *address* [*address2 ... address8*]	Specifies the IP address of the default router for a DHCP client. One IP address is required, although you can specify up to eight addresses in one command line.

Configuring the Address Lease Time

By default, each IP address assigned by a DHCP server comes with a one-day lease, which is the amount of time that the address is valid. To change the lease value for an IP address, use the following command in DHCP pool configuration mode:

Command	Purpose
Router(config-dhcp)# **lease** {*days* [*hours*][*minutes*] | **infinite**}	Specifies the duration of the lease. The default is a a one-day lease.

Configuring Manual Bindings

An address binding is a mapping between the IP address and Media Access Control (MAC) address of a client. The IP address of a client can be assigned manually by an administrator or assigned automatically from a pool by a DHCP server.

Manual bindings are IP addresses that have been manually mapped to the MAC addresses of hosts that are found in the DHCP database. Manual bindings are stored in NVRAM on the DHCP server. Manual bindings are just special address pools. There is no limit on the number of manual bindings.

Automatic bindings are IP addresses that have been automatically mapped to the MAC addresses of hosts that are found in the DHCP database. Automatic bindings are stored on a remote host called a database agent. The bindings are saved as text records for easy maintenance.

To configure a manual binding, first create a host pool, then specify the IP address and hardware address of the client or client identifier. The hardware address is the MAC address. The client identifier, which is required for Microsoft clients (instead of hardware addresses), is formed by concatenating the media type and the MAC address of the client. Refer to the “Address Resolution Protocol Parameters” section of RFC 1700, *Assigned Numbers*, for a list of media type codes.

To configure manual bindings, use the following commands beginning in global configuration mode:

Step	Command	Purpose
1	Router(config)# **ip dhcp pool** *name*	Creates a name for the a DHCP server address pool and places you in DHCP pool configuration mode—identified by the (config-dhcp)# prompt.
2	Router(config-dhcp)# **host** *address* [*mask* | */prefix-length*]	Specifies the IP address and subnet mask of the client. The prefix length specifies the number of bits that comprise the address prefix. The prefix is an alternative way of specifying the network mask of the client. The prefix length must be preceded by a forward slash (/).
3	Router(config-dhcp)# **hardware-address** *hardware-address type* or Router(config-dhcp)# **client-identifier** *unique-identifier*	Specifies a hardware address for the client. Specifies the distinct identification of the client in dotted-hexadecimal notation, for example, 01b7.0813.8811.66, where 01 represents the Ethernet media type.
4	Router(config-dhcp)# **client-name** *name*	(Optional) Specifies the name of the client using any standard ASCII character. The client name should not include the domain name. For example, the name **mars** should not be specified as **mars.cisco.com**.

Configuring a DHCP Server Boot File

The boot file is used to store the boot image for the client. The boot image is generally the operating system the client uses to load. To specify a boot file for the DHCP client, use the following command in DHCP pool configuration mode:

Command	Purpose
Router(config-dhcp)# **bootfile** *filename*	Specifies the name of the file that is used as a boot image.

Configuring the Number of Ping Packets

By default, the DHCP server pings a pool address twice before assigning the address to a requesting client. If the ping is unanswered, the DHCP server assumes (with a high probability) that the address is not in use and assigns the address to the requesting client. To change the number of ping packets the DHCP server should send to the pool address before assigning the address, use the following command in global configuration mode:

Command	Purpose
Router(config)# **ip dhcp ping packets** *number*	Specifies the number of ping packets the DHCP server sends to a pool address before assigning the address to a requesting client. The default is two packets.

Configuring the Timeout Value for Ping Packets

By default, the DHCP server waits 500 milliseconds before timing out a ping packet. To change the amount of time the server waits, use the following command in global configuration mode:

Command	Purpose
Router(config)# **ip dhcp ping timeout** *milliseconds*	Specifies the amount of time the DHCP server must wait before timing out a ping packet. The default 500 milliseconds.

Enabling the Cisco IOS DHCP Server Feature

By default, the Cisco IOS DHCP Server feature is enabled on your router. If the feature is disabled, use the following command in global configuration mode to reenable the Cisco IOS DHCP Server feature on your router:

Command	Purpose
Router(config)# **service dhcp**	Enables the Cisco IOS DHCP Server feature on your router. Use the **no** form of this command to disable the Cisco IOS DHCP Server feature.

Monitoring and Maintaining the DHCP Server

To clear DHCP server variables, use the following commands in privileged EXEC mode, as needed:

Command	Purpose
Router# **clear ip dhcp binding** *address* | *****	Deletes an automatic address binding from the DHCP database. Specifying *address* clears the automatic binding for a specific (client) IP address whereas specifying asterisk (*****) clears all automatic bindings.
Router# **clear ip dhcp conflict** *address* | *****	Clears an address conflict from the DHCP database. Specifying *address* clears the conflict for a specific IP address whereas specifying an asterisk (*) clears conflicts for all addresses.
Router# **clear ip dhcp server statistics**	Resets all DHCP server counters to 0.

To enable DHCP server debugging, use the following command in privileged EXEC mode, as needed:

Command	Purpose
Router# **debug ip dhcp server** {**events** | **packets** | **linkage**}	Enables debugging on the DHCP server.

To display DHCP server information, use the following commands in EXEC mode, as needed:

Command	Purpose
Router> **show ip dhcp binding** [*address*]	Displays a list of all bindings created on a specific DHCP server.
Router> **show ip dhcp conflict** [*address*]	Displays a list of all address conflicts recorded by a specific DHCP server.
Router# **show ip dhcp database** [*url*]	Displays recent activity on the DHCP database. **Note** Use this command in privileged EXEC mode.
Router> **show ip dhcp server statistics**	Displays count information about server statistics and messages sent and received.

Configuration Examples

This section provides the following configuration examples:

- DHCP Database Agent Configuration Example
- DHCP Address Pool Configuration Example
- Manual Bindings Configuration Example

DHCP Database Agent Configuration Example

The following example stores bindings on host 172.16.4.253. The file transfer protocol is FTP. The server should wait 2 minutes (120 seconds) before writing database changes.

```
ip dhcp database ftp://user:password@172.16.4.253/router-dhcp write-delay 120
```

DHCP Address Pool Configuration Example

In the following example, three DHCP address pools are created: one in network 172.16.0.0, one in subnetwork 172.16.1.0, and one in subnetwork 172.16.2.0. Attributes from network 172.16.0.0, such as the domain name, DNS server, NetBIOS name server, and NetBIOS node type, are inherited in subnetworks 172.16.1.0 and 172.16.2.0. In each pool, clients are granted 30-day leases and all addresses in each subnetwork, except the excluded addresses, are available to the DHCP server for assigning to clients. Table 1 lists the IP addresses for the devices in three DHCP address pools.

Table 1 DHCP Address Pool Devices

Pool 0 (Network 172.16.0.0)		Pool 1 (Subnetwork 172.16.1.0)		Pool 2 (Subnetwork 172.16.2.0)	
Device	**IP Address**	**Device**	**IP Address**	**Device**	**IP Address**
Default routers	–	Default routers	172.16.1.100 172.16.1.101	Default routers	172.16.2.100 172.16.2.101
DNS server	172.16.1.102 172.16.2.102	—	—	—	—
NetBIOS name server	172.16.1.103 172.16.2.103	—	—	—	—
NetBIOS node type	h-node	—	—	—	—

```
ip dhcp database ftp://user:password@172.16.4.253/router-dhcp write-delay 120
ip dhcp excluded-address 172.16.1.100 172.16.1.103
ip dhcp excluded-address 172.16.2.100 172.16.2.103
!
ip dhcp pool 0
 network 172.16.0.0 /16
 domain-name cisco.com
 dns-server 172.16.1.102 172.16.2.102
 netbios-name-server 172.16.1.103 172.16.2.103
 netbios-node-type h-node
!
ip dhcp pool 1
 network 172.16.1.0 /24
 default-router 172.16.1.100 172.16.1.101
 lease 30
!
ip dhcp pool 2
 network 172.16.2.0 /24
 default-router 172.16.2.100 172.16.2.101
 lease 30
```

Manual Bindings Configuration Example

The following example creates a manual binding for a client named Mars.cisco.com. The MAC address of the client is 02c7.f800.0422 and the IP address of the client is 172.16.2.254.

```
ip dhcp pool Mars
 host 172.16.2.254
 hardware-address 02c7.f800.0422 ieee802
 client-name Mars
```

Because attributes are inherited, the previous configuration is equivalent to the following:

```
ip dhcp pool Mars
 host 172.16.2.254 mask 255.255.255.0
 hardware-address 02c7.f800.0422 ieee802
 client-name Mars
 default-router 172.16.2.100 172.16.2.101
 domain-name cisco.com
 dns-server 172.16.1.102 172.16.2.102
 netbios-name-server 172.16.1.103 172.16.2.103
 netbios-node-type h-node
```

Command Reference

This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.0 command reference publications.

- **bootfile**
- **clear ip dhcp binding**
- **clear ip dhcp conflict**
- **clear ip dhcp server statistics**
- **client-identifier**
- **client-name**
- **default-router**
- **dns-server**
- **domain-name**
- **hardware-address**
- **host**
- **ip dhcp conflict logging**
- **ip dhcp database**
- **ip dhcp excluded-address**
- **ip dhcp ping packets**
- **ip dhcp ping timeout**
- **ip dhcp pool**
- **ip dhcp relay information check**
- **ip dhcp relay information option**
- **ip dhcp relay information policy**
- **lease**
- **netbios-name-server**
- **netbios-node-type**
- **network (DHCP)**
- **next-server**
- **option**
- **service dhcp**
- **show ip dhcp binding**
- **show ip dhcp conflict**
- **show ip dhcp database**
- **show ip dhcp server statistics**

In Cisco IOS Release 12.0(1)T or later, you can search and filter the output for **show** and **more** commands. This functionality is useful when you need to sort through large amounts of output, or if you want to exclude output that you do not need to see.

To use this functionality, enter a **show** or **more** command followed by the "pipe" character (|), one of the keywords **begin**, **include**, or **exclude**, and an expression that you want to search or filter on:

command | {**begin** | **include** | **exclude**} *regular-expression*

Following is an example of the show atm vc command in which you want the command output to begin with the first line where the expression "PeakRate" appears:

show atm vc | begin PeakRate

For more information on the search and filter functionality, refer to the *Cisco IOS Configuration Fundamentals Configuration Guide*.

bootfile

To specify the name of the default boot image for a Dynamic Host Configuration Protocol (DHCP) client, use the **bootfile** DHCP pool configuration command. Use the **no** form of this command to delete the boot image name.

bootfile *filename*

no bootfile

Syntax Description

filename	Specifies the name of the file that is used as a boot image.

Defaults

No default behavior or values.

Command Modes

DHCP pool configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

Examples

The following example specifies xllboot as the name of the boot file:

```
bootfile xllboot
```

Related Commands

ip dhcp pool
next-server

clear ip dhcp binding

To delete an automatic address binding from the Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server database, use the **clear ip dhcp binding** privileged EXEC command.

clear ip dhcp binding *address* | ***

Syntax Description

address	The address of the binding you want to clear.
*	Clears all automatic bindings.

Command Modes

Privileged EXEC

Usage Guidelines

Typically, the address denotes the client's IP address. If the asterisk (*) character is used as the address parameter, DHCP clears all automatic bindings.

Use the **no ip dhcp pool** global configuration command to delete a manual binding.

Examples

The following example deletes the address binding 10.12.1.99 from a DHCP server database:

```
clear ip dhcp binding 10.12.1.99
```

Related Commands

show ip dhcp binding

clear ip dhcp conflict

To clear an address conflict from the Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server database, use the **clear ip dhcp conflict** privileged EXEC command.

clear ip dhcp conflict *address* | ***

Syntax Description

address	The IP address of the host that contains the conflicting address you want to clear.
*	Clears all address conflicts.

Command Modes

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

The server detects conflicts using a ping session. The client detects conflicts using gratuitous Address Resolution Protocol (ARP). If the asterisk (*) character is used as the address parameter, DHCP clears all conflicts.

Examples

The following example shows an address conflict of 10.12.1.99 being deleted from the DHCP server database:

```
clear ip dhcp conflict 10.12.1.99
```

Related Commands

show ip dhcp conflict

clear ip dhcp server statistics

To reset all Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server counters, use the **clear ip dhcp server statistics** privileged EXEC command.

clear ip dhcp server statistics

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

The **show ip dhcp server statistics** command displays DHCP counters. All counters are cumulative. The counters will be initialized, or set to zero, with this command.

Examples

The following example resets all DHCP counters to zero:

```
clear ip dhcp server statistics
```

Related Commands

show ip dhcp server statistics

client-identifier

To specify a Microsoft Dynamic Host Configuration Protocol (DHCP) client's unique identifier (in dotted-hexadecimal notation), use the **client-identifier** DHCP pool configuration command. It is valid for manual bindings only. Use the **no** form of this command to delete the client identifier.

client-identifier *unique-identifier*

no client-identifier

Syntax Description

unique-identifier	The distinct identification of the client in dotted-hexadecimal notation, for example, 01b7.0813.8811.66.

Defaults

None

Command Modes

DHCP pool configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

Microsoft DHCP clients require client identifiers instead of hardware addresses. The client identifier is formed by concatenating the media type and the MAC address. For example, the Microsoft client identifier for Ethernet address b708.1388.f166 is 01b7.0813.88f1.66, where 01 represents the Ethernet media type. For a list of media type codes, refer to the "Address Resolution Protocol Parameters" section of RFC 1700, *Assigned Numbers*.

Examples

The following example specifies the client identifier for Mac address b7.0813.8811.66 in dotted-hexadecimal notation:

```
client-identifier 01b7.0813.8811.66
```

Related Commands

hardware-address
host
ip dhcp pool

client-name

To specify the name of a Dynamic Host Configuration Protocol (DHCP) client, use the **client-name** DHCP pool configuration command. The client name should not include the domain name. Use the **no** form of this command to remove the client name.

client-name *name*

no client-name

Syntax Description

name	Specifies the client's name, using any standard ASCII character. The client name should not include the domain name. For example, the name **mars** should not be specified as **mars.cisco.com**.

Defaults

None

Command Modes

DHCP pool configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

Examples

The following example specifies a string client1 that will be the name of the client:

```
client-name client1
```

Related Commands

host
ip dhcp pool

default-router

To specify the default router list for a Dynamic Host Configuration Protocol (DHCP) client, use the **default-router** DHCP pool configuration command. Use the **no** form of this command to remove the default router list.

default-router *address* [*address2 ... address8*]

no default-router

Syntax Description

address	Specifies the IP address of a router. One IP address is required, although you can specify up to eight addresses in one command line.

Defaults

None

Command Modes

DHCP pool configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

The IP address of the router should be on the same subnet as the client subnet. You can specify up to eight routers in the list. Routers are listed in order of preference (address1 is the most preferred router, address2 is the next most preferred router, and so on).

Examples

The following example specifies 10.12.1.99 as the IP address of the default router:

```
default-router 10.12.1.99
```

Related Commands

ip dhcp pool

dns-server

To specify the Domain Name System (DNS) IP servers available to a Dynamic Host Configuration Protocol (DHCP) client, use the **dns-server** DHCP pool configuration command. Use the **no** form of this command to remove the DNS server list.

dns-server *address* [*address2 ... address8*]

no dns-server

Syntax Description

address	Specifies the IP address of a DNS server. One IP address is required, although you can specify up to eight addresses in one command line.

Defaults

If DNS IP servers are not configured for a DHCP client, the client cannot correlate host names to IP addresses.

Command Modes

DHCP pool configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

Servers are listed in order of preference (address1 is the most preferred server, address2 is the next most preferred server, and so on).

Examples

The following example specifies 10.12.1.99 as the IP address of the domain name server of the client:

```
dns-server 10.12.1.99
```

Related Commands

domain-name
ip dhcp pool

domain-name

To specify the domain name for a Dynamic Host Configuration Protocol (DHCP) client, use the **domain-name** DHCP pool configuration command. Use the **no** form of this command to remove the domain name.

domain-name *domain*

no domain-name

Syntax Description

domain	Specifies the client's domain name string.

Defaults

None.

Command Modes

DHCP pool configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

Examples

The following example specifies cisco.com as the domain name of the client:

```
domain-name cisco.com
```

Related Commands

dns-server
ip dhcp pool

hardware-address

To specify the hardware address of a Dynamic Host Configuration Protocol (DHCP) client, use the **hardware-address** DHCP pool configuration command. It is valid for manual bindings only. Use the **no** form of this command to remove the hardware address.

hardware-address *hardware-address type*

no hardware-address

Syntax Description

hardware-address	Specifies the MAC address of the client's hardware platform.
type	Indicates the protocol of the hardware platform. Strings and values are acceptable. The string options are: • ethernet • ieee802 The value options are: • 1 10Mb Ethernet • 6 IEEE 802 If no type is specified, the default protocol is Ethernet.

Defaults

Ethernet is the default type if none is specified.

Command Modes

DHCP pool configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

Examples

The following example specifies b708.1388.f166 as the MAC address of the client:

```
hardware-address b708.1388.f166
```

Related Commands

client-identifier
host
ip dhcp pool

host

To specify the IP address and network mask for a manual binding to a Dynamic Host Configuration Protocol (DHCP) client, use the **host** DHCP pool configuration command. Use the **no** form of this command to remove the client's IP address.

host *address* [*mask* | */prefix-length*]

no host

Syntax Description

address	Specifies the IP address of the client.
mask	(Optional) Specifies the network mask of the client.
/prefix-length	(Optional) Specifies the number of bits that comprise the address prefix. The prefix is an alternative way of specifying the network mask of the client. The prefix length must be preceded by a forward slash (/).

Defaults

None

Command Modes

DHCP pool configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

If the mask and prefix length are unspecified, DHCP examines its address pools. If no mask is found in the pool database, the Class A, B, or C natural mask is used. This command is valid for manual bindings only.

Examples

The following example specifies 10.12.1.99 as the client's IP address and 255.255.248.0 as the subnet mask:

```
host 10.12.1.99 255.255.248.0
```

Related Commands

client-identifier
hardware-address
ip dhcp pool
network (DHCP)

ip dhcp conflict logging

To enable conflict logging on a Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server, use the **ip dhcp conflict logging** global configuration command. Use the **no** form of this command to disable conflict logging.

ip dhcp conflict logging

no ip dhcp conflict logging

Syntax Description

This command has no arguments or keywords.

Defaults

Conflict logging is enabled.

Command Modes

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

Cisco recommends using a DHCP server database agent to store automatic bindings. If you decide not to use a DHCP server database agent to store automatic bindings, use the **no ip dhcp conflict logging** command to disable the recording of address conflicts. By default, the Cisco IOS DHCP Server records DHCP address conflicts in a log file.

Example

The following example disables the recording of DHCP address conflicts:

```
no ip dhcp conflict logging
```

Related Commands

clear ip dhcp conflict
ip dhcp database
show ip dhcp conflicts

ip dhcp database

You can configure a Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server to save automatic bindings on a remote host called a database agent. To configure a DHCP server database agent and database agent parameters, use the **ip dhcp database** global configuration command. Use the **no** form of this command to remove the database agent.

ip dhcp database *url* [**timeout** *seconds* | **write-delay** *seconds*]

no ip dhcp database *url*

Syntax Description

url	Specifies the remote file used to store the automatic bindings. Following are the acceptable URL file formats: • tftp://host/filename • ftp://user:password@host/filename • rcp://user@host/filename
timeout *seconds*	(Optional) Specifies how long, in seconds, the DHCP server should wait before aborting a database transfer. Transfers that exceed the timeout period are aborted. By default, DHCP waits 300 seconds before aborting a database transfer. Infinity is defined as 0 seconds.
write-delay *seconds*	(Optional) Specifies how soon the DHCP server should send database updates. By default, DHCP waits 300 seconds (5 minutes) before sending database changes. The minimum delay is 60 seconds.

Defaults

DHCP waits 300 seconds for both a write delay and a timeout.

Command Modes

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

The administrator may configure multiple database agents. Bindings are transferred by using the File Transfer Protocol (FTP), Trivial File Transport Protocol (TFTP), or remote copy protocol (RCP).

Example

The following example specifies the DHCP database transfer timeout value at 80 seconds:

```
ip dhcp database ftp://user:password@172.16.1.1/router-dhcp timeout 80
```

The following example specifies the DHCP database update delay value at 100 seconds:

```
ip dhcp database tftp://172.16.1.1/router-dhcp write-delay 100
```

Related Commands

show ip dhcp database

ip dhcp excluded-address

To specify IP addresses that a Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server should not assign to DHCP clients, use the **ip dhcp excluded-address** global configuration command. Use the **no** form of this command to remove the excluded IP addresses.

ip dhcp excluded-address *low-address* [*high-address*]

no ip dhcp excluded-address *low-address* [*high-address*]

Syntax Description

low-address	The excluded IP address, or first IP address in an excluded address range.
high-address	(Optional) The last IP address in the excluded address range.

Defaults

All IP pool addresses are assignable.

Command Modes

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

The DHCP server assumes that all pool addresses may be assigned to clients. Use this command to exclude a single IP address or a range of IP addresses.

Example

The following example configures an excluded IP address range from 172.16.1.100 through 172.16.1.199:

```
ip dhcp excluded-address 172.16.1.100 172.16.1.199
```

Related Commands

ip dhcp pool
network (DHCP)

ip dhcp ping packets

To specify the number of packets a Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server sends to a pool address as part of a ping operation, use the **ip dhcp ping packets** global configuration command. Use the **no** form of this command to prevent the server from pinging pool addresses.

ip dhcp ping packets *count*

no ip dhcp ping packets

Syntax Description

count	Indicates the number of ping packets that are sent before assigning the address to a requesting client. The default value is two packets.

Defaults

Two packets

Command Modes

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

The DHCP server pings a pool address before assigning the address to a requesting client. If the ping is unanswered, the DHCP server assumes (with a high probability) that the address is not in use and assigns the address to the requesting client.

Examples

The following example specifies five ping attempts by the DHCP server before ceasing any further ping attempts:

```
ip dhcp ping packets 5
```

Related Commands

clear ip dhcp conflicts
ip dhcp ping timeout
show ip dhcp conflicts

ip dhcp ping timeout

To specify how long a Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server waits for a ping reply from an address pool, use the **ip dhcp ping timeout** global configuration command. Use the **no** form of this command to restore the default number of milliseconds (500) of the timeout.

ip dhcp ping timeout *milliseconds*

no ip dhcp ping timeout

Syntax Description

milliseconds	The amount of time in milliseconds that the DHCP server waits for a ping reply before it stops attempting to reach a pool address for client assignment. The maximum timeout is 10000 milliseconds (10 seconds). The default timeout is 500 milliseconds.

Defaults

500 milliseconds

Command Modes

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

This command specifies how long to wait for a ping reply in milliseconds.

Examples

The following example specifies that the DHCP server will wait 800 milliseconds for a ping reply before considering the ping a failure:

```
ip dhcp ping timeout 800
```

Related Commands

clear ip dhcp conflicts
ip dhcp ping packets
show ip dhcp conflicts

ip dhcp pool

To configure a Dynamic Host Configuration Protocol (DHCP) address pool on a Cisco IOS DHCP Server and enter DHCP pool configuration mode, use the **ip dhcp pool** global configuration command. Use the **no** form of this command to remove the address pool.

ip dhcp pool *name*

no ip dhcp pool *name*

Syntax Description

name	Can either be a symbolic string (such as “engineering”) or an integer (such as 0).

Defaults

DHCP address pools are not configured.

Command Modes

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

During execution, the configuration mode changes to DHCP pool configuration mode, identified by the (config-dhcp)# prompt. In this mode, the administrator can configure pool parameters, like the IP subnet number and default router list.

Examples

The following example configures pool1 as the DHCP address pool:

```
ip dhcp pool pool1
```

Related Commands

host
ip dhcp excluded-address
network (DHCP)

ip dhcp relay information check

To configure a Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server to validate the relay agent information option in forwarded BOOTREPLY messages, use the **ip dhcp relay information check** global configuration command. Use the **no** form of this command to disable an information check.

ip dhcp relay information check

no ip dhcp relay information check

Syntax Description

This command has no arguments or keywords.

Defaults

The DHCP server checks relay information. Invalid messages are dropped.

Command Modes

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

This command is used by cable modem termination systems. By default, DHCP checks relay information. Invalid messages are dropped.

Examples

The following example configures the DHCP server to check that the relay agent information option in forwarded BOOTREPLY messages is valid:

```
ip dhcp relay information check
```

Related Commands

ip dhcp relay information option
ip dhcp relay information policy

ip dhcp relay information option

To configure a Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server to insert the DHCP relay agent information option in forwarded BOOTREQUEST messages, use the **ip dhcp relay information option** global configuration command. Use the **no** form of this command to disable inserting relay information to forwarded BOOTREQUEST messages.

ip dhcp relay information option

no ip dhcp relay information option

Syntax Description

This command has no arguments or keywords.

Defaults

The DHCP server does not insert relay information.

Command Modes

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

This command is used by cable modem termination systems. By default, DHCP does not insert relay information.

Examples

The following example configures a DHCP server to insert the DHCP relay agent information option in forwarded BOOTREQUEST messages:

```
ip dhcp relay information option
```

Related Commands

ip dhcp relay information check
ip dhcp relay information policy

ip dhcp relay information policy

To configure a Dynamic Host Configuration Protocol (DHCP) relay agent's information reforwarding policy (what a DHCP relay agent should do if a message already contains relay information), use the **ip dhcp relay information policy** global configuration command. Use the **no** form of this command to restore the default relay information policy.

ip dhcp relay information policy {**drop** | **keep** | **replace**}

no ip dhcp relay information policy

Syntax Description

drop	Directs the DHCP relay agent to discard messages with existing relay information if the relay information option is already present.
keep	Indicates that existing information is left unchanged on the DHCP relay agent.
replace	Indicates that existing information is overwritten on the DHCP relay agent.

Defaults

The DHCP server replaces existing relay information.

Command Modes

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

This command is used by cable modem termination systems. When a DHCP relay agent receives a message from a another DHCP relay agent, relay information might already be present in the message. By default, the relay information from the previous relay agent is replaced.

Examples

The following examples configure a DHCP relay agent to drop messages with existing relay information, keep existing information, and replace existing information:

```
ip dhcp relay information policy drop

ip dhcp relay information policy keep

ip dhcp relay information policy replace
```

Related Commands

ip dhcp relay information check
ip dhcp relay information option

lease

To configure the duration of the lease for an IP address that is assigned from a Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server to a DHCP client, use the **lease** DHCP pool configuration command. Use the **no** form of this command to restore the default value.

lease {*days* [*hours*][*minutes*] | **infinite**}

no lease

Syntax Description

days	Specifies the duration of the lease in numbers of days.
hours	(Optional) Specifies the number of hours in the lease. A *days* value must be supplied before you can configure an *hours* value.
minutes	(Optional) Specifies the number of minutes in the lease. A *days* value and an *hours* value must be supplied before you can configure a *minutes* value.
infinite	Specifies the duration of the lease is unlimited.

Defaults

One day

Command Modes

DHCP pool configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

Examples

The following example shows a one-day lease:

```
lease 1
```

The following example shows a one-hour lease:

```
lease 0 1
```

The following example shows a one-minute lease:

```
lease 0 0 1
```

The following example shows an infinite (unlimited) lease:

```
lease infinite
```

Related Commands

ip dhcp pool

netbios-name-server

To configure NetBIOS Windows Internet Naming Service (WINS) name servers that are available to Microsoft Dynamic Host Configuration Protocol (DHCP) clients, use the **netbios-name-server** DHCP pool configuration command. Use the **no** form of this command to remove the NetBIOS name server list.

netbios-name-server *address* [*address2...address8*]

no netbios-name-server

Syntax Description

address	Specifies the IP address of the NetBIOS WINS name server.

Defaults

None

Command Modes

DHCP pool configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

One IP address is required, although you can specify up to eight addresses in one command line. Servers are listed in order of preference (address1 is the most preferred server, address2 is the next most preferred server, and so on).

Examples

The following example specifies the IP address of a NetBIOS name server available to the client:

```
netbios-name-server 10.12.1.90
```

Related Commands

dns-server
domain-name
ip dhcp pool
netbios-node-type

netbios-node-type

To configure the NetBIOS node type for Microsoft Dynamic Host Configuration Protocol (DHCP) clients, use the **netbios-node-type** DHCP pool configuration command. Use the **no** form of this command to remove the NetBIOS node type.

netbios-node-type *type*

no netbios-node-type

Syntax Description

type	Specifies the NetBIOS node type. Valid types are: • **b-node** Broadcast • **p-node** Peer-to-peer • **m-node** Mixed • **h-node** Hybrid (recommended)

Defaults

None

Command Modes

DHCP pool configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

The recommended type is h-node (hybrid).

Examples

The following example specifies the client's NetBIOS type as hybrid:

```
netbios node-type h-node
```

Related Commands

ip dhcp pool
netbios-name-server

network (DHCP)

To configure the subnet number and mask for a Dynamic Host Configuration Protocol (DHCP) address pool on a Cisco IOS DHCP Server, use the **network** DHCP pool configuration command. Use the **no** form of this command to remove the subnet number and mask.

network *network-number* [*mask* | */prefix-length*]

no network

Syntax Description

network-number	The IP address of the DHCP address pool.
mask	(Optional) The bit combination that renders which portion of the address of the DHCP address pool refers to the network or subnet and which part refers to the host.
/prefix-length	(Optional) Specifies the number of bits that comprise the address prefix. The prefix is an alternative way of specifying the network mask of the client. The prefix length must be preceded by a forward slash (/).

Defaults

None

Command Modes

DHCP pool configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

This command is valid for DHCP subnetwork address pools only. If the mask or prefix length is not specified, the class A, B, or C natural mask is used. The DHCP server assumes that all host addresses are available. The system administrator can exclude subsets of the address space by using the **ip dhcp excluded-address** command.

Examples

The following example configures 172.16.0.0/16 as the DHCP pool's subnetwork number and mask:

```
network 172.16.0.0 /16
```

Related Commands

host
ip dhcp excluded-address
ip dhcp pool

next-server

To configure the next server in a Dynamic Host Configuration Protocol (DHCP) client's boot process, use the **next-server** DHCP pool configuration command. Use the **no** form of this command to remove the boot server list.

next-server *address* [*address2...address8*]

no next-server *address*

Syntax Description

address	Specifies the IP address of the next server in the boot process, which is typically a Trivial File Transfer Protocol (TFTP) server. One IP address is required, although you can specify up to eight addresses in one command line.

Defaults

If the **next-server** command is not used to configure a boot server list, the DHCP server uses inbound interface helper addresses as boot servers.

Command Modes

DHCP pool configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

You can specify up to eight servers in the list. Servers are listed in order of preference (address1 is the most preferred server, address2 is the next most preferred server, and so on).

Examples

The following example specifies 10.12.1.99 as the IP address of the next server in the boot process:

```
next-server 10.12.1.99
```

Related Commands

bootfile
ip dhcp pool
ip helper-address
option

option

To configure Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server options, use the **option** DHCP pool configuration command. Use the **no** form of this command to remove the options.

option *code* [**instance** *number*] {**ascii** *string* | **hex** *string* | **ip** *address*}

no option *code* [**instance** *number*]

Syntax Description

code	Specifies the DHCP option code.
instance *number*	(Optional) Specifies a number from 0 to 255.
ascii *string*	Specifies an NVT ASCII character string. ASCII character strings that contain white space must be deliminated by quotation marks.
hex *string*	Specifies dotted-hexadecimal data. Each byte in hexidecimal character strings is two hexidecimal digits—each byte can be separated by a period, colon, or white space.
ip *address*	Specifies an IP address.

Defaults

The default instance number is 0.

Command Modes

DHCP pool configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

DHCP provides a framework for passing configuration information to hosts on a TCP/IP network. Configuration parameters and other control information are carried in tagged data items that are stored in the options field of the DHCP message. The data items themselves are also called options. The current set of DHCP options are documented in RFC 2131, *Dynamic Host Configuration Protocol*.

Examples

The following example configures DHCP option 19, which specifies whether the client should configure its IP layer for packet forwarding. A value of 0 means disable IP forwarding; a value of 1 means enable IP forwarding. IP forwarding is enabled in the following example:

```
option 19 hex 01
```

The following example configures DHCP option 72, which specifies the World Wide Web servers for DHCP clients. World Wide Web servers 172.16.3.252 and 172.16.3.253 are configured in the following example:

```
option 72 ip 172.16.3.252 172.16.3.253
```

Related Commands

ip dhcp pool

service dhcp

To enable the Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server feature on your router, use the **service dhcp** global configuration command. Use the **no** form of this command to disable the Cisco IOS DHCP Server feature.

service dhcp

no service dhcp

Syntax Description

This command has no keywords or arguments.

Defaults

The feature is enabled.

Command Modes

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

Examples

The following example enables DHCP services on the DHCP server:

```
service dhcp
```

show ip dhcp binding

To display address bindings on the Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server, use the **show ip dhcp binding** EXEC command.

show ip dhcp binding [*address*]

Syntax Description

address	(Optional) Specifies the IP address of the DHCP client for which bindings will be displayed.

Defaults

None

Command Modes

EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

If the address is not specified, all address bindings are shown. Otherwise, only the binding for the specified client is displayed.

Examples

The following examples show the DHCP binding address parameters, including an IP address, an associated MAC address, a lease expiration date, and the type of address assignment that have occurred. Table 2 lists descriptions of the fields in each example.

```
Router> show ip dhcp binding 172.16.1.11

IP address     Hardware address    Lease expiration      Type
172.16.1.11    00a0.9802.32de      Feb 01 1998 12:00 AM  Automatic

Router> show ip dhcp binding 172.16.3.254

IP address     Hardware address    Lease expiration      Type
172.16.2.254   02c7.f800.0422      Infinite              Manual
```

Table 2 show ip dhcp Field Descriptions

Field	Description
IP address	The IP address of the host as recorded on the DHCP server.
Hardware address	The MAC address or client identifier of the host as recorded on the DHCP server.
Lease expiration	The lease expiration date of the IP address of the host.
Type	The manner in which the IP address was assigned to the host.

Related Commands

clear ip dhcp binding

show ip dhcp conflict

To display address conflicts found by a Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server when addresses are offered to the client, use the **show ip dhcp conflict** EXEC command.

show ip dhcp conflict [*address*]

Syntax Description

address	(Optional) Specifies the IP address of the conflict found.

Defaults

None

Command Modes

EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

The server detects conflicts using ping. The client detects conflicts using gratuitous Address Resolution Protocol (ARP). If an address conflict is detected, the address is removed from the pool and the address will not be assigned until an administrator resolves the conflict.

Examples

The following example displays the detection method and detection time for all IP addresses the DHCP server has offered that have conflicts with other devices. Table 3 lists descriptions of the fields in the example.

```
Router> show ip dhcp conflict

IP address     Detection Method    Detection time
172.16.1.32    Ping                Feb 16 1998 12:28 PM
172.16.1.64    Gratuitous ARP      Feb 23 1998 08:12 AM
```

Table 3 show ip dhcp conflict Field Descriptions

Field	Description
IP Address	The IP address of the host as recorded on the DHCP server.
Detection Method	The manner in which the IP address of the hosts were found on the DHCP server. Can be a ping or a gratuitous ARP.
Detection time	The time when the conflict was found.

Related Commands

clear ip dhcp conflict
ip dhcp ping packets
ip dhcp ping timeout

show ip dhcp database

To display Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server database agent information, use the **show ip dhcp database** Privileged EXEC command.

show ip dhcp database [*url*]

Syntax Description

url	(Optional) Specifies the remote file used to store automatic DHCP bindings. Following are the acceptable URL file formats: • tftp://host/filename • ftp://user:password@host/filename • rcp://user@host/filename

Defaults

If a URL is not specified, all database agent records are shown. Otherwise, only information about the specified agent is displayed.

Command Modes

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

Examples

The following example shows all DHCP server database agent information. Table 4 lists descriptions for each field in the example.

```
Router# show ip dhcp database

URL         :   ftp://user:password@172.16.4.253/router-dhcp
Read        :   Dec 01 1997 12:01 AM
Written     :   Never
Status      :   Last read succeeded. Bindings have been loaded in RAM.
Delay       :   300 seconds
Timeout     :   300 seconds
Failures    :   0
Successes   :   1
```

Table 4 show ip dhcp database Field Descriptions

Field	Description
URL	Specifies the remote file used to store automatic DHCP bindings. Following are the acceptable URL file formats: • tftp://host/filename • ftp://user:password@host/filename • rcp://user@host/filename

Table 4 show ip dhcp database Field Descriptions (continued)

Field	Description
Read	The last time bindings were read from the file server.
Written	The last time bindings were written to the file server.
Status	Indication of whether the last read or write of host bindings was successful.
Delay	The amount of time to wait before updating the database.
Timeout	The amount of time before the file transfer is aborted.
Failures	The number of failed file transfers.
Successes	The number of successful file transfers.

Related Commands

ip dhcp database

show ip dhcp server statistics

To display Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server statistics, use the **show ip dhcp server statistics** EXEC command.

show ip dhcp server statistics

Syntax Description

This command has no arguments or keywords.

Defaults

None

Command Modes

EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

Examples

The following example displays DHCP server statistics. Table 5 lists descriptions for each field in the example.

```
Router> show ip dhcp server statistics

Memory usage          40392
Address pools         3
Database agents       1
Automatic bindings    190
Manual bindings       1
Expired bindings      3
Malformed messages    0

Message               Received
BOOTREQUEST           12
DHCPDISCOVER          200
DHCPREQUEST           178
DHCPDECLINE           0
DHCPRELEASE           0
DHCPINFORM            0

Message               Sent
BOOTREPLY             12
DHCPOFFER             190
DHCPACK               172
DHCPNAK               6
```

Table 5 show ip dhcp server statistics Field Descriptions

Field	Description
Memory usage	The number of bytes of RAM allocated by the DHCP server.
Address pools	The number of configured address pools in the DHCP database.
Database agents	The number of database agents configured in the DHCP database.
Automatic bindings	The number of IP addresses that have been automatically mapped to the MAC addresses of hosts that are found in the DHCP database.
Manual bindings	The number of IP addresses that have been manually mapped to the MAC addresses of hosts that are found in the DHCP database.
Expired bindings	The number of expired leases.
Malformed messages	The number of truncated or corrupted messages that were received by the DHCP server.
Message	The DHCP message type that was received by the DHCP server.
Received	The number of DHCP messages that were received by the DHCP server.
Sent	The number of DHCP messages that were sent by the DHCP server.

Related Commands

clear ip dhcp server statistics

Debug Commands

This section describes the following new **debug** command:

- **debug ip dhcp server**

debug ip dhcp server

To enable Cisco IOS Dynamic Host Configuration Protocol (DHCP) Server debugging, use the **debug ip dhcp server** privileged EXEC command. Use the **no** form of this command to disable DHCP server debugging.

debug ip dhcp server {**events | packets | linkage**}
no debug ip dhcp server {**events | packets | linkage**}

Syntax Description

events	Reports server events, like address assignments and database updates.
packets	Decodes DHCP receptions and transmissions.
linkage	Displays database linkage information (such as parent-child relationships in a radix tree).

Defaults

DHCP server debugging is not enabled.

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

Examples

The first example below shows a combination of DHCP server events and decoded receptions and transmissions. The second example below shows database linkage information.

```
Router# debug ip dhcp server events
Router# debug ip dhcp server packets
DHCPD:DHCPDISCOVER received from client 0b07.1134.a029 through relay 10.1.0.253.
DHCPD:assigned IP address 10.1.0.3 to client 0b07.1134.a029.
DHCPD:Sending DHCPOFFER to client 0b07.1134.a029 (10.1.0.3).
DHCPD:unicasting BOOTREPLY for client 0b07.1134.a029 to relay 10.1.0.253.
DHCPD:DHCPREQUEST received from client 0b07.1134.a029.
DHCPD:Sending DHCPACK to client 0b07.1134.a029 (10.1.0.3).
DHCPD:unicasting BOOTREPLY for client 0b07.1134.a029 to relay 10.1.0.253.
DHCPD:checking for expired leases.

Router# debug ip dhcp server linkage
DHCPD:child  pool:10.1.0.0 / 255.255.0.0 (subnet10.1)
DHCPD:parent pool:10.0.0.0 / 255.0.0.0 (net10)
DHCPD:child  pool:10.0.0.0 / 255.0.0.0 (net10)
DHCPD:pool (net10) has no parent.
DHCPD:child  pool:10.1.0.0 / 255.255.0.0 (subnet10.1)
DHCPD:parent pool:10.0.0.0 / 255.0.0.0 (net10)
DHCPD:child  pool:10.0.0.0 / 255.0.0.0 (net10)
DHCPD:pool (net10) has no parent.
```

Related Commands

show ip dhcp bindings
show ip dhcp database

Glossary

address binding—A mapping between the client's IP and hardware (MAC) addresses. The client's IP address may be configured by the administrator (manual address allocation) or assigned from a pool by the DHCP server (automatic address allocation). The binding also contains a lease expiration date. The default for the lease expiration date is one day.

address conflict—A duplication of use of the same IP address by two hosts. During address assignment, DHCP checks for conflicts using ping and gratuitous ARP. If a conflict is detected, the address is removed from the pool. The address will not be assigned until the administrator resolves the conflict.

address pool—The range of IP addresses assigned by the DHCP server. Address pools are indexed by subnet number.

client—Any host requesting configuration parameters.

database—A collection of address pools and bindings.

database agent—Any host storing the DHCP bindings database, for example, a Trivial File Transfer Protocol (TFTP) server.

DNS—Domain Name System. A system used in the Internet for translating names of network nodes into addresses.

automatic address allocation—An address assignment method where a network administrator obtains an IP address for a client for a finite period of time or until the client explicitly relinquishes the address. Automatic allocation is particularly useful for assigning an address to a client that will be connected to the network only temporarily or for sharing a limited pool of IP addresses among a group of clients that do not need permanent IP addresses. Automatic allocation may also be a good choice for assigning an IP address to a new client being permanently connected to a network where IP addresses are sufficiently scarce that it is important to reclaim them when old clients are retired.

Dynamic Host Configuration Protocol (DHCP)—A protocol that provides a mechanism for allocating IP addresses dynamically so that addresses can be reused when hosts no longer need them.

manual address allocation—An address assignment method that allocates an administratively assigned IP address to a host. Manual allocation allows DHCP to be used to eliminate the error-prone process of manually configuring hosts with IP addresses.

server—Any host providing configuration parameters.